

Contributions of Non-Urban State Parks to Youth Physical Activity: A Case Study in Northern Georgia

Lincoln R. Larson
Jason W. Whiting
Gary T. Green
J. M. Bowker

EXECUTIVE SUMMARY: A growing body of research has documented positive relationships among youth physical activity levels and park use. However, most investigations to date have focused on municipal parks, and relatively little is known about the physical activity levels of racially and ethnically diverse populations of youth using different types of parks in non-urban settings. This exploratory case study addressed these research gaps by examining the influence of non-urban state parks on the physical activity of youth in northern Georgia, USA. Data were collected via intercept surveys of parents/guardians (who served as proxies and provided information about youth in their visitor group/family) visiting three state parks ($n = 677$, summer 2010) and nine park-proximate flea markets ($n = 268$, summer 2011). Flea markets were selected as a comparative study site to assess the relative contributions of state parks to youth physical activity because they provided unique access to large numbers of low-income, racial/ethnic minority children and adolescents from the general population who may or may not visit state parks. Intercept survey instruments assessed multiple variables including overall youth physical activity levels, park-based physical activity, activity correlates, and frequency of use for different physical activity locations (including state parks). Results showed that most youth (88%) participated in at least one hour of physical activity during state park visits. Participation rates for specific activities varied by demographic group. Park-based physical activity correlates included race/ethnicity (with Latinos less active than other groups), parent perceptions of health-related benefits (positive relationship to physical activity), and youth participation in socially oriented activities (positive relationship to physical activity). Though youth were generally very active during state park visits, few youth (28%) visited the focal parks on a monthly or weekly basis, and even fewer in the flea market sample (22%) visited any Georgia state park often or very often. Local environments such as homes/backyards (used often or very often by 83% of youth) and neighborhood sidewalks and streets (58%) were more frequently used physical activity locations. Overall, this study revealed high levels of youth physical activity during visits to non-urban state parks. Park-based physical activity levels and activity preferences differed by demographic group. Results suggested that park-based physical activity among all groups of youth could be

enhanced by management approaches that foster inter-generational interactions and create opportunities for active, adult-mediated, child-centered recreational pursuits. Findings also showed that state parks may be less important than other recreation destinations for promoting the physical activity of youth from non-urban settings. Efforts to encourage youth physical activity outside of urban areas should therefore emphasize a range of family-friendly recreation options and locations (including, but not limited to state parks) that account for the diverse recreation preferences of children and their parents. For park and recreation practitioners, ongoing efforts to monitor perceptions about parks and recreational services may provide insightful information about to whom to promote use of parks, trails, and other outdoor recreation areas. Examining differences within subgroups across time can help to identify potential priority populations to address in efforts to increase PA and encourage ORA use which in turn may address health disparities and improve public health.

KEYWORDS: *children, parks, physical activity, race/ethnicity, recreation*

AUTHORS: Lincoln R. Larson is with the Department of Parks, Recreation, and Tourism Management, Clemson University, LRL@clemson.edu. Jason W. Whiting is with the Department of Recreation Administration, California State University. Gary T. Green is with the Warnell School of Forestry and Natural Resources, University of Georgia. J. M. Bowker is with the USDA Forest Service, Athens, GA.

ACKNOWLEDGMENTS: The authors wish to acknowledge the Parks, Recreation and Historic Sites Division of the Georgia Department of Natural Resources for its financial support and assistance with this project.

Physical inactivity and sedentary behaviors are major factors contributing to high rates of childhood obesity and cardiovascular disease in the United States (Bauman & Craig, 2005; Lou, 2014; Ogen, Carroll, Kit, & Flegal, 2012). Although many obesity prevention and physical activity campaigns focus on legislative, regulatory, and policy-oriented mechanisms (Boehmer, Luke, Haire-Joshu, Bates, & Brownson, 2008), a growing body of research suggests that prevention measures could adopt a more organic, holistic, and cost effective approach centered on environmental contexts (Roux et al., 2008; Sallis et al., 2006; Wells, Ashdown, Davies, Cowett, & Yang, 2007). By creating green environments that provide numerous opportunities for outdoor recreation and physically active play (Almanza, Jerrett, Dunton, Seto, & Pentz, 2012), public parks present a promising solution for combatting physical inactivity and related health issues in children (Blanc et al., 2012; Maller, Townsend, Pryor, Brown, & St. Leger, 2006; Moody et al., 2004; Mowen, Kaczynski, & Cohen, 2008).

Parks and Physical Activity Research

Recognizing important associations between parks and physical activity, researchers and professionals are working to validate and publicize the important contributions of parks to active and healthy lifestyles among youth (Godbey & Mowen, 2010; Kellert, 2005; Roemmich et al., 2006; Sherer, 2006; Timperio et al., 2008). Innovative federal measures such as the proposed Healthy Kids Outdoors Act and America's Great Outdoors Initiative have added momentum to this movement (America's Great Outdoors, 2011; Pannell, 2011), and ongoing efforts to assess the effects of park use on physical activity among diverse youth are beginning to inform park design and management. For example,

Roemmich et al. (2006) found that the percentage of total park area in a community is a significant predictor of children's physical activity, observing a 1.4% increase in physical activity levels for every 1% increase in park area. Another study of youth (aged 5 to 20) in Atlanta examined travel diary data and found a significant relationship between the number of neighborhood parks and recreation facilities and children's walking frequency (Frank, Kerr, Chapman, & Sallis, 2007). In an experiment designed to reduce sedentary behavior, Epstein et al. (2006) discovered that increases in children's (aged 8 to 15) physical activity were magnified with greater amounts of parkland nearby. Similarly, Cohen et al.'s (2006) study of adolescent girls in six cities used accelerometers to discover that participants with more parks close to home achieved higher physical activity levels.

In addition to basic park proximity, the provision of diverse activities and facilities also appears to be an important factor influencing children's physically active recreation behavior (Davison & Lawson, 2006; Sallis & Glanz, 2006). When appealing options are available, children are generally more active in parks than adults. For example, observational studies conducted in Tampa and Chicago showed that 44% to 52% of all children were observed participating in MVPA compared to 23% to 47% of adults (Floyd, Spengler, Maddock, Gobster, & Suau, 2008a, 2008b). That data collection effort also revealed that courts, open space, and opportunities for unstructured free play were associated with children's physical activity (Spengler et al., 2011). Similar studies conducted in North Carolina municipal parks showed that 47.4% of children were observed in MVPA and highlighted correlates of physical activity including gender (males), aged (0 to 5 years), adult presence (negative influence), other active children (positive influence), interactions between age, facilities, and formality of play, and variety of urban form factors (Baran et al., 2013; Floyd et al., 2011). This type of research is beginning to illustrate more detailed relationships between children's park use and physical activity, but many scholars agree that more work is needed to affirm these park-based activity levels and the social and environmental characteristics that influence them (Evenson & Mota, 2011; Floyd et al., 2011; Gardsjord, Tveit, & Nordh, 2013; Godbey & Mowen, 2010).

Because studies of youth park-based physical activity have typically focused on cities and neighborhood parks, many scholars have called for an expansion of assessments that includes different types of parks (e.g., state parks) outside of urban areas (Shores & West, 2010; Wilhelm-Stanis, Schneider, Shinew, Chavez, & Vogel, 2009). Such assessments are needed for several reasons. For example, youth in rural areas are more likely to be overweight than their urban counterparts (Liu, Bennett, Harun, & Probst, 2008; Nelson, Gordon-Larsen, Song, & Popkin, 2006). However, research has also shown that youth in rural areas may be slightly more active than youth living in cities (Joens-Matre et al., 2008). These differences may be partially due to varying levels of access to outdoor recreation opportunities and public parks (Michimi & Wimberly, 2012; Shores & West, 2010). For instance, though many urban youth live within walking distance of neighborhood parks, their actual park use may be negatively impacted by perceived park quality (Ries et al., 2009). On the other hand, though safe, high-quality parks may be more prevalent outside of urban centers, non-urban youth generally require some type of transportation to access these recreation areas and facilities (Yousefian, Ziller, Swartz, & Hartley, 2009). Furthermore, evidence suggests that visitors using non-urban parks with different types of recreational amenities and opportunities may display unique physical activity patterns and preferences that warrant more attention (Frost et al., 2010; Moore et al., 2010; Salmon et al., 2013; Wilhelm-Stanis et al., 2009). Efforts to understand the influence of parks on the physical activity participation rates of youth outside of cities would therefore benefit from improved understanding of park-based activity trends and correlates in these non-urban settings.

Studies are also needed to explicitly investigate connections between parks and physical activity among youth from low-income or racial/ethnic minority communities, populations that typically experience reduced access to recreation facilities and higher risk of associated health problems (Cutts, Darby, Boone, & Brewis, 2009; Floyd, Taylor,

& Whitt-Glover, 2009; Kumanyika & Grier, 2006). For example, a national study of adolescents found that low levels of physical activity in Hispanic and black girls have been attributed to the schools they attend—a common proxy for neighborhood context (Richmond, Hayward, Gahagan, Field, & Heisler, 2006). Even when parks are available, their potential contributions to youth physical activity may be offset by social characteristics including parental perceptions of personal risk (measured through neighborhood crime and traffic fatalities), safety, and local park quality (Cutts et al., 2009; Miles, 2008). Despite recent advances, most research examining park use and physical activity among African American, Latino, and Asian youth has primarily focused on urban areas (Babey, Hastert, Yu, & Brown, 2008; Floyd et al., 2011; Ries et al., 2009). Although previous research has examined correlates of physical activity behavior of racial/ethnic minority and low-income rural youth, these studies have not directly explored the role of parks in physical activity promotion (Pate et al., 1997; Trost et al., 1997; Yousefian et al., 2009).

The research gaps outlined above highlight the need for studies that investigate the potential contributions of non-urban parks to the physical activity of children and adolescents from racial/ethnic minority and low-income backgrounds. State parks provide an ideal location to explore these relationships. First, state parks are popular, predominantly non-urban recreation destinations that attract a wide range of visitors. In fact, Siikamaki (2011) found that Americans spend approximately one third of their total nature-based outdoor recreation time in state parks. Second, because of their distance from densely populated urban centers, many state parks offer an array recreation options (e.g., lakes, beaches, forested trails, overnight camping) that are generally unavailable in city parks. These options might appeal to distinct types of users and demographic groups, thereby generating different types of park-based physical activity. For instance, Whiting, Larson, and Green (2012) observed marked discrepancies in state park use patterns among racial/ethnic minority groups: Latinos and African Americans displayed proportionately higher visitation to lakes, beaches, and picnic areas, while white visitors displayed proportionately higher use of park trails. Third, several studies have already documented high levels of physical activity among adults using state parks (Mowen, Trauntvein, Graefe, & Son, 2012; Wilhelm Stanis, Schneider, & Anderson, 2009). Mowen et al. (2012) found that over 60% of Pennsylvania state park users reported participating in moderate or vigorous physical activity during their visit. Wilhelm Stanis et al. (2009) found that almost 90% of Minnesota state park visitors reported participating in moderate or vigorous activity at the study park at some point in the last 12 months. However, Wilhelm Stanis et al. (2009) also discovered that that state parks were not used as frequently as other leisure time physical activity destinations (e.g., sidewalks and streets, homes, other parks), a finding that has been supported in Georgia (Larson, Whiting, Green, & Bowker, 2014). Although these investigations have explored a range of physical activity correlates and constraints ranging from individual characteristics to environmental factors, it has not examined the state park use patterns and physical activity of youth.

This study explored youth park usage and physical activity levels in non-urban areas of northern Georgia, a state whose population consistently ranks among the most inactive and obese in the country (Centers for Disease Control and Prevention, 2010). Using parent/guardian-reported measures of youth physical activity in non-urban state parks (through a sample of state park visitors) and surrounding communities (through a sample of flea market attendees in areas near the study parks), this study addressed three key research questions focused on relationships between park environments and physical activity in non-urban settings. These questions are outlined below, with the sample population of youth used to address them noted in parentheses:

- RQ1: How physically active are youth in non-urban state parks? (state park visitors)
- RQ2: What social and environmental factors are associated with youth's state park-based physical activity in these non-urban areas? (state park visitors)

RQ3: How frequently do youth use state parks compared to other potential physical activity locations in non-urban areas? (flea market attendees)

Method

Setting and Research Design

This study focused on two populations: (1) visitors to three state parks in northern Georgia located 40 to 90 miles from downtown Atlanta, and (2) a general population proxy sample of attendees at nine flea markets in the same area. The state parks ranged in size from 1,776 to 3,712 acres and contained facilities and attributes (e.g., lake, hiking trails, picnic areas, campgrounds) found in many state parks around the country. The three state parks were selected due to their non-urban location, high annual visitation rates, and park managers' anecdotal reports of visitor demographics reflecting the increasing racial/ethnic diversity prevalent throughout the southeastern U.S. Flea markets were selected as a comparative study site for data collection because they provided access to a diverse segment of the population (particularly low-income, racial/ethnic minority populations) that (1) may or may not visit parks and (2) is often undersampled using conventional household survey methods. The flea markets varied in size (from 15 to 1,000 vendors), and each was located within 35 miles of a focal state park. Because previous research in the public health (Miller, Wilder, Stillman, & Beckler, 1997) and environmental management (Moskell & Allred, 2013) fields have demonstrated that intercept survey sampling is an effective strategy for increasing response rates, reducing reporting bias, and building trust between interviewers and interviewees, intercept surveys were used for data collection at both sites.

Survey data in state parks were collected from May to September 2010. Sampling dates at state parks were selected based on a stratified random sampling protocol that ensured adequate coverage across four strata: Wednesdays (free admission days), other weekdays, weekend days, and holiday weekends. Research days were randomly assigned *a priori* subject to the constraint that researchers visited each park on at least two Wednesdays, three other weekdays, six weekend days, and one holiday weekend. Collection efforts targeted zones of high day use visitor activity within each park such as beaches and picnic areas, yielding a diverse array of participants. During intercept surveying, trained interviewers approached every group of adult (age ≥ 18) state park visitors in the target zones and asked if anyone in their group would be willing to participate in a brief survey (in English or Spanish) about state park use. Upon consent, participants were handed a two-page survey. Although five different survey versions were used in the larger data collection effort, only one version of the survey—the one focused on youth physical activity—was used for this particular study. If the participant received a youth-focused version of the survey, he/she was instructed to answer questions about the child (age < 18) in their visitor group who had the most recent birthday. The overall state park response rate was 91.5% (total $n = 677$). Most survey respondents indicated they were parents of the child (72.6%), though grandparents (7.5%), aunts and uncles (6.1%), and older siblings (3.8%) also served as proxies.

Survey data in flea markets were collected from March to July 2011. Collection efforts employed the same approach used in state parks and focused on two types of flea market attendees: vendors and customers. The flea market response rate was 73.7% (total $n = 268$). Similar to the state park sample, most survey participants indicated they were parents of the child (63.8%), though grandparents (14.1%), older siblings (8.6%), and aunts and uncles (7.6%) also served as proxies. Demographics of youth in both samples are presented in Table 1, with comparisons to the population in the 21-county study region and the entire state of Georgia.

Intercept Survey Instruments

State park survey items addressed physical activity levels (within and outside of state parks), park visitation, and demographics. Park-based physical activity questions first asked

adults to estimate how many minutes youth in their group had spent in the state park during their trip today. Separate follow-up questions then asked respondents to report how much of this total park visitation time each child spent participating in (1) “moderate physical activities that cause a small increase in breathing or heart rate (such as fast walking or swimming),” and (2) “vigorous physical activities that cause a large increase in breathing or heart rate (such as running or fast biking).” These items used a similar question structure that has been tested and validated in common lifestyle surveys such as the Behavior Risk Factors Surveillance System (Centers for Disease Control and Prevention, 2009) and the Physical Activity in Parks Survey (Walker et al., 2009), and were pilot tested in Georgia State parks the summer prior to data collection (2009). A similar approach to assessing self-reported, park-based physical activity has also been used in a previous study focused on state park visitors (Mowen et al., 2012). To determine regular activity levels based on recommendations from the Centers for Disease Control and Prevention (2010), participants were asked to estimate how many days in a typical week children “participated in physical activities (including walking) that cause an increase in breathing or heart rate for at least 60 minutes at a time.” Although a number of limitations including reporting and recall bias are associated with self-reported physical activity data involving adult proxies (Sallis & Saelens, 2000), such metrics are frequently employed in park-based physical activity studies focused on state parks where direct observations of dispersed visitors are more difficult (A. J. Mowen et al., 2012; Wilhelm Stanis et al., 2009).

Park visitation questions asked respondents to estimate children’s state park summer visitation frequency (more than once a week, about once a week, about once a month, or about once this summer), and general participation in various outdoor activities while at the park. Parents/guardians were also asked to indicate on a scale from 1 = *strongly disagree* to 5 = *strongly agree* the extent to which they agreed with two statements about the potential health benefits of their children’s outdoor recreation. These items (“increase physical activity” and “improve physical health”) were averaged to form a single measure of parent perceived health-related outdoor recreation benefits (Cronbach’s $\alpha = 0.909$). Flea market survey items were similar to those used in state parks, including questions related to overall physical activity participation, general state park visitation, and demographics. The flea market survey also included an additional question that asked respondents to report how often youth used various locations to engage in physical activity, with frequency of use for each location rated on a scale from 1 = *never* to 5 = *very often*. Place of residence data were not collected on the survey version used in this analysis, but inferences about youth’s residency could be inferred from “ZIP code at place of residence” data collected through the other survey versions focused on adults. This information was used to confirm the assumption that youth visiting the focal state parks and flea markets were predominantly from non-urban areas.

Analysis

Following procedures used in many physical activity analyses, self-reported moderate and vigorous physical activity levels were added to form a general moderate-plus-vigorous (MVPA) activity category. Ordinary least squares (OLS) regression was used to examine the influence of social and environmental factors on youth MVPA time during state park visits. Cases where reported MVPA during park visits was missing or exceeded 12 hours were excluded from the analysis to minimize the effects of outliers and potentially erroneous self-reported data, resulting in an effective sample of 564 park visitors. Youth participation in park-based outdoor recreation activities was compared across demographic categories using Pearson’s chi-square tests. Relationships between activity participation and total MVPA time in park were assessed using partial point biserial correlations that controlled for total time in park. Youth physical activity location use frequency was examined using a within-subjects repeated measures design that included univariate (with Greenhouse-Geisser corrections to account for the violation of sphericity) and multivariate analysis of variance tests. The dependent variable was the “frequency of use” rating for each of five potential youth physical activity locations. Listwise deletions of cases with missing data

resulted in an effective sample size of 206. Associations between the subjective “frequency of use” scale ratings and regular PA levels (i.e., physically active days per week) were examined using point biserial correlations.

Results

Demographic distributions of youth in the state park and flea market samples were generally similar, with a slightly higher percentage of Latinos and adolescents at flea markets (Table 1). ZIP code data showed that most state park visitors (68.3%) and flea market attendees (60.7%) were of local origin (i.e., living within 20 miles of at least one of the north Georgia study sites), suggesting that the study sites were primarily, but not exclusively, serving non-urban populations. As anticipated based on the site selection criteria, both the state park and flea market intercept survey samples included a higher proportion of Latinos and a lower proportion of whites than the overall population in the surrounding areas (Table 1). Levels of reported regular youth physical activity appeared to be comparable across both survey samples and the Georgia population (Table 1).

State Park-based Physical Activity Levels and Correlates

State park survey data revealed most youth were active during their trips to the non-urban state parks. According to adult proxies, 95.1% of youth participated in at least one minute of physical activity during their visit and 88.2% engaged in at least one hour of MVPA during their visit; 83.8% participated in at least one hour of moderate activity, 63.8% participated in at least 30 minutes of vigorous activity. About 20% of youth participated in five or more hours of moderate or vigorous physical activity. Youth engaged in MVPA for an average of 3.18 ± 0.15 hours (median = 3.0 hours) during state park visits.

Significant predictors of youth’s MVPA during day use and overnight park visits included total time in park, regular active days per week, state park visitation frequency, parent/guardian perceptions of health-related recreation benefits, and use of beaches (Table 2). Race/ethnicity was also significantly associated with park-based MVPA, with Hispanic/Latinos and Asians/Others displaying lower levels of physical activity than whites or African Americans.

Overall, the most-popular recreation activities for youth during state park visits were swimming and beach activities. Relationships between outdoor activities and physically active time in parks showed that use of beach areas and playgrounds were the strongest correlates of youth’s total park-based MVPA (Table 3). Demographic differences in activity patterns were also evident for age and racial/ethnic groups, but not gender (Table 3).

Frequency of Use for State Parks vs. Other Physical Activity Locations

Univariate, $F(3.72, 762.87) = 73.55$, $P < 0.001$, and multivariate, Wilk’s Lambda = 0.39, $F(4, 202) = 79.79$, $P < 0.001$, within-subjects tests indicated frequency of use ratings for various youth physical activity locations differed significantly in the flea market sample. Pairwise comparisons revealed that youth in non-urban areas were physically active at their homes and backyards more often than any other location (Table 4). Neighborhood areas such as parks and streets or sidewalks were the next most commonly used youth physical activity locations. Gyms/recreation centers and state parks were used at approximately equal rates, though frequency of use for these locations was significantly lower than that in other youth physical activity settings. Youth exhibiting more frequent use of physical activity locations were also more likely to exhibit higher levels of weekly activity, validating the anticipated relationship between “frequency of use” ratings and overall physical activity (Table 4).

Table 1*Demographic Characteristics of State Park and Flea Market Samples*

Variable	Day Use Areas^a	Flea Markets^b	Pop. in Study Region^c	Pop. in Georgia^c
Sample Size (n)	677	268	4,033,579	9,919,945
Gender (%)				
Female	41.8	47.7	51.0	51.1
Male	51.7	49.5	49.0	48.9
Did not report	6.5	2.9		
Age (%)			No data available	25.7% <age 18:
0-5 year olds	26.6	14.6	-	33.1
6-9 years olds	29.7	16.0	-	22.3
10-12 year olds	22.5	29.1	-	13.3
13-17 year olds	20.8	40.3	-	30.9
Did not report	0.4	3.9		
Race/Ethnicity (%)				
White/Caucasian	49.3	31.3	56.3	55.9
Hispanic/Latino	33.7	46.6	13.0	8.8
Black/African American	11.1	13.4	24.6	30.5
Asian/Other	5.2	7.1	5.9	4.8
Did not report	2.3	1.5		
Mean Total Time in Park (Hours with SD)	4.87 (1.93)	N/A	N/A	N/A
Mean Weekly PA (Days/week with SD)	4.21 (2.02)	4.30 (1.92)	No data available	No data available
Parent/Guardian Rating: Physical Health Benefits of Youth Outdoor Rec^d	4.37 (0.81)	4.35 (0.84)	N/A	N/A
Youth Participating in Regular Phys. Act.^e (%)	45.7	48.7	No data available	47.3 ^f

^a Proportions reflect pooled sample of all youth visitors to all state parks across sampling periods.

^b Proportions reflect pooled sample of all youth visitors to all flea markets across sampling periods.

^c Estimates based on total 2012 population projections (including adults) from U.S. Census Bureau. Study region included the 21 counties containing or adjacent to state parks and flea markets in north Georgia where sampling occurred.

^d Parent/guardian ratings of physical health benefits associated with youth outdoor recreation were rated on a scale from 1 = Strongly disagree to 5 = Strongly agree

^e Regular activity for youth defined as 60 or minutes of moderate or vigorous physical activity at least 5 days per week.

^f Physical activity estimates from 2010 Georgia Physical Activity Surveillance Report. Percentage of youth regularly active in Georgia represents average for middle and high school students across Georgia (data for elementary school students not available).

Table 2

OLS Regression Estimates for Factors Associated with Youth's Physical Activity Levels (Total Hours of MVPA^a) During Visits to Georgia State Parks, 2010

Variable	B	SE	Sig.	Mean
Constant	-2.514	0.467		
Total Time in Park (hrs.)	0.590	0.036	<0.001	4.87
State Park Visitation Frequency ^b	0.283	0.141	0.046	0.36
Regular Weekly PA (days/week)	0.140	0.034	<0.001	4.12
Parent/Guardian Rating of Phys. Health	0.426	0.083	<0.001	4.38
Benefits of Youth Outdoor Rec ^c				
Gender (Male)	0.220	0.132	0.097	0.55
Age (years)	0.007	0.016	0.656	8.69
Race (Latino) ^d	-0.500	0.154	0.001	0.34
Race (Black) ^d	0.120	0.222	0.590	0.11
Race (Asian/Other) ^d	-0.714	0.300	0.018	0.05
Activity Location - Beach ^e	0.304	0.137	0.027	0.63
Activity Location - Hiking/Walking Trails ^e	0.107	0.163	0.513	0.23
Activity Location - Picnic Area ^e	0.086	0.143	0.547	0.61
Activity Location - Playground ^e	0.067	0.144	0.641	0.37

^a Mean moderate plus vigorous physical activity (MVPA) = 3.18 ± 0.15 hours; Model Fit Statistics: $F(13,545) = 28.26$, $P < 0.001$, adjusted $R^2 = 0.39$

^b Summer state park visitation frequency coded as 0 = not frequent visitor (once a month or less), 1 = frequent visitor (more than once a month, often weekly)

^c Parent/guardian ratings of physical health benefits associated with youth outdoor recreation were rated on a scale from 1 = Strongly disagree to 5 = Strongly agree

^d White served as the reference category

^e Activity locations coded as 0 = Did not use, 1 = Used

Table 3

Outdoor Recreation Participation and Physical Activity Associations Among Diverse Groups of Youth Visiting Georgia State Parks, 2010 (n = 677)

Outdoor Activity	Children Participating During Visit (%) ^a	Phys. Act. Correlation (partial r_{pb}) ^b	Demographic Differences (Groups with Highest Participation Rates)		
			Gender Diff ^c	Age Diff ^d	Race/Ethnic Diff ^e
Swimming	70.5	0.069	No sig. differences		W **
Beach activities	63.2	0.120**			
Picnic/cookout	59.2	0.036			A, L, B ***
Playground	38.1	0.091*		0-5, 6-9 ***	B **
Relaxing/no act.	29.0	0.009		13-17 ***	B ***
Hiking/walking	23.0	0.057			
Fishing	11.2	0.069		6-9, 10-12 **	
Canoeing/kayaking	10.6	-0.038		10-12, 13-17 ***	
Jogging/running	10.9	0.022			L ***
Wildlife viewing	8.3	-0.079*			A *
Visiting hist. site	6.4	0.050		6-9, 10-12 **	W, A **
Team sports	4.4	0.007			L **
Motor boating	4.3	0.003		13-17 *	
Visitor cntr./exhibit	3.4	0.066		10-12, 6-9 ***	A *
Biking	3.0	0.006			
Other activities	4.3	0.061			W *

*, **, *** denotes significance of r_{pb} or χ^2 statistic at $\alpha = 0.05$, 0.01, and 0.001 respectively. Groups with highest participation rates are listed.

^a Percentages represent pooled data from all three focal parks.

^b Partial point biserial correlations measure the degree of association between activity participation and MVPA time in park, controlling for total time in park

^c Gender Codes: F = females, M = males (no significant differences were observed)

^d Age Codes: 0-5, 6-9, 10-12, 13-17 year olds

^e Race/ethnicity Codes: A = Asian, B = Black, L = Hispanic, W = White

Table 4

Youth Physical Activity Location Frequency of Use Reported by Survey Respondents at North Georgia Flea Markets, 2011 (n = 206)

Youth Physical Activity Location	Mean Frequency of Use Rating ¹	SD	% of Sample Using "Often" ²	Phys. Act. Corr. (r _{pb}) ³
Home or backyard	4.31 ^a	1.11	83.0	0.203**
Neighborhood streets & sidewalks	3.51 ^b	1.44	57.9	0.140*
Neighborhood parks	3.43 ^b	1.29	51.0	0.135*
Gym or recreation center	2.72 ^c	1.45	33.9	0.123
State parks	2.64 ^c	1.23	22.0	0.039

Note: Means sharing a superscript letter do not significantly differ based on paired t-tests with Bonferroni correction for multiple comparisons to hold familywise error rate at $\alpha = 0.05$. Multivariate model statistics: Wilk's Lambda = 0.39, $F(4, 202) = 79.79$, $P < 0.001$, partial eta-squared = 0.612

¹ Ratings were based on Likert-type scale where 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Often, 5 = Very often

² 5-point Likert-type frequency of use rating was converted to a dichotomous scale depicting frequent use where 0 = 1-3 (Never to Occasionally) and 1 = 4-5 (Often or Very Often).

³ Point biserial correlations depict relationship between physically active days per week and use of various PA locations (often vs. not often); *, **, *** denote statistical significance or r_{pb} at $\alpha = 0.05, 0.01, 0.001$, respectively

Discussion

State Park-based Physical Activity Levels and Correlates

Most youth were active during visits to non-urban state parks, and moderate and vigorous activity levels during park visits exceeded the CDC's recommended daily activity levels for children (Centers for Disease Control and Prevention, 2010). Total visit time was a key predictor of youth physical activity, with an increase of approximately 35 minutes MVPA for every additional hour spent in the park. Another key predictor of park-based physical activity was the extent to which the youth engaged in regular physical activity on a weekly basis (within or outside of parks). Youth who tended to be more active in their day-to-day lives were also more active in state parks. Regular state park visitors also tended to be more active within parks than infrequent visitors. Both relationships support previous research and suggest that a predisposition towards active lifestyles could be positively associated with and reinforced by youth park use and physical activity (Corder, Sallis, Crespo, & Elder, 2011). Conversely, low levels of physical activity during park visits for youth who are typically more sedentary in their daily lives (e.g., Latinos) highlight opportunities for improvement.

Parent/guardian perceptions of health benefits associated with youth outdoor recreation were also linked to park-based physical activity. The statistically significant strength of this relationship underscores the critical role of parental support in youth physical activity promotion (Beets, Cardinal, & Alderman, 2010; Cleland et al., 2011; Trost & Loprinzi, 2011; Whitt-Glover et al., 2009). Research has also shown that family support networks may be especially important among Latinos (Cronan, Shinew, & Stodolska, 2008; Marquez & McAuley, 2006; Stodolska, Shinew, & Li, 2010) and African Americans (Sanderson et al., 2003). This study provides additional evidence linking family-based recreation and physical activity, demonstrating the value of management approaches that foster inter-generational interactions and nurture active, adult-mediated, child-centered recreation opportunities across age groups (Carver, Timperio, & Crawford, 2008; Maller et al., 2006). Complex relationships between physical activity and children's type of play (structured vs. unstructured) in other park contexts (Baran et al., 2013; Floyd et al., 2011) highlight the need for more work that explores evolving relationships between adult attitudes, co-participation, and youth physical activity in a variety of family-oriented recreation destinations such as state parks.

Efforts to promote park-based physical activity should also account for distinct outdoor recreation patterns and preferences of different demographic groups. Some activities and park zones (e.g., beach areas) were popular across all groups and significantly correlated with MVPA. Participation in other activities varied across groups, and relationships between these activities and park-based MVPA were generally weaker than anticipated. Although significant gender differences were not evident for any activity, age mattered. Playgrounds were especially popular among younger children aged 0 to 9 years. Other studies have also highlighted the value of playgrounds to young children's physical activity (Active Living Research, 2011; Baran et al., 2013), and a concerted effort could be made to locate playgrounds near picnic areas and adult recreation facilities. Teens, the least active group, were more likely than younger children to participate in team sports or water-based activities. Because teen's physical activity behavior is partially driven by the powerful influence of proximal social networks such as peers (Hohepa, Scragg, Schofield, Kolt, & Schaaf, 2007), an enhanced emphasis on similar social forms of outdoor recreation might help to address declines in physical activity that begin in early adolescence and often continue throughout the lifespan (Babey et al., 2008).

Race/ethnicity was significantly associated with youth's total MVPA during state park visits, with lower physical activity levels among Latino and Asian youth. Observed differences may be partially explained by distinct activity preferences among youth from different racial/ethnic groups (Floyd et al., 2009). Latino, African American, and Asian youth tended to engage in picnics and cookouts more often than whites. White youth participated in swimming more often than other groups, and African American children used playgrounds more than other groups. Latino children were more likely to jog, run, or play team sports. Many of these youth recreation patterns mirror cultural differences observed in previous studies highlighting African American and Latino affinity for social activities and developed settings (Gobster, 2002; Stodolska et al., 2010). As the U.S. population grows and becomes more racially and ethnically diverse, efforts to encourage park-based physical activity among diverse groups of youth will need to create recreation opportunities that reflect these distinct preferences and account for structural, personal, and cultural factors that affect physical activity participation (Floyd et al., 2009; Shores, Moore, & Yin, 2010).

Frequency of Use for State Parks vs. Other Physical Activity Locations

Although responses of state park visitors demonstrated a variety of ways in which state parks contribute to youth physical activity participation, these responses did not effectively address another important question: What is the overall importance of state parks (with respect to other potential recreation destinations) for the physical activity of youth in non-urban areas? Past research examining frequency of use for different physical activity locations has focused on adults, and these studies have been relatively inclusive. Some have shown that homes and neighborhood settings (e.g., streets/sidewalks) were the most frequently used PA locations (Huston, Evenson, Bors, & Gizlice, 2003; Larson et al., 2014), while others have noted the prominent role of public parks in adults' PA pursuits across a variety of U.S. metropolitan areas (Wilhelm-Stanis et al., 2009). This sample of flea market attendees in this study provides one of the first looks at frequency of use for physical locations among youth, highlighting the relative importance of various physical activity sites including state parks in non-urban areas.

Results revealed that non-urban state parks, though contributors to youth physical activity, were not used as often for children's physically active pursuits as sites closer to home (e.g., homes/backyards, neighborhood parks, sidewalks, and streets). In fact, only 22% of youth sampled in flea markets reported visiting state parks often very often. State park visitor data supported these trends, showing that only 28% of youth visited the focal state parks at least once a month. Studies of adult state park visitors have revealed similar patterns, with average visitation rates to study parks substantially lower than once a month (Mowen et al., 2012; Wilhelm Stanis et al., 2009). Such infrequent visitation may yield minimal impacts on physical activity and health for a majority of state park

visitors, regardless of age. Youth physical activity promotion efforts in non-urban areas could therefore (1) strive to acknowledge and account for activities occurring outside of parks within or closer to the home environment and (2) emphasize expansions that increase access to and utilization of a wider range of physical activity settings, including state parks. Though resources for accomplishing these objectives are typically limited, carefully planned interventions and community engagement can yield substantial increases in park-based physical activity (Cohen et al., 2013).

Management Implications

Results of this study have multiple implications for the management of state parks and the promotion of youth physical activity in non-urban areas. First, findings suggest that youth visiting state parks tend to be very active, and physical activity levels increase substantially with more time spent in the park. Through provision of a diverse array of activities and recreational offerings that might increase visitor interest and subsequent visit duration, state parks may increase their capacity to serve families and youth seeking active experiences. Managers should also recognize and explicitly account for differences in youth activity levels and associated recreation preferences by demographic group. For example, playgrounds were particularly important to African American youth and children under age 10, while water-based activities were especially popular among white youth and adolescents. Latino youth were more likely to run, walk, or engage in team sports than any other group. Physically active recreation associated with social activities such as picnics and cookouts was significantly higher among Latinos, African American, and Asian youth than among white youth. By identifying and understanding these recreation patterns and preferences, state park managers will be better positioned to meet the needs of an increasingly diverse population of young visitors. Because youth activity is also closely associated with parental perceptions and preferences, state park managers interested in encouraging active recreation could also strive to cultivate and emphasize opportunities for co-participation across generations in family-oriented recreational pursuits.

Finally, due to low visitation rates, results suggest that state parks alone are unlikely to generate substantial physical activity benefits for youth in non-urban areas. Other physical activity locations such as home/backyard settings are used much more frequently, and should be emphasized in conjunction with parks and other recreation destinations in youth physical activity promotion efforts outside of cities. This could be achieved through comprehensive ecological approach that acknowledges contributions of multiple recreation contexts (including, but not limited to parks) in the development of healthy, active communities (Baran et al., 2013; Sallis, Owen, & Fisher, 2008). By examining the influence of non-urban state park use patterns and preferences on the physical activity levels on youth, investigations such as this exploratory north Georgia case study could inform efforts to strategically promote physical activity across diverse populations.

Study Limitations and Future Research

Future studies examining relationships between youth park use and physical activity could build upon this investigation and address several limitations. First, although study sites were intentionally selected to represent parks throughout the state and region, the focal state parks contained some features and amenities that may be atypical of parks in similar regions. The delimitation of this sample to summer day use visitors at three state parks in northern Georgia may constrain inferences to other seasons, park zones, and geographical areas. Recreation preferences and patterns expressed and observed at large state parks might not translate to smaller parks. Future research could also expand the present scope of inquiry to account for other youth physical activity settings and opportunities that occur outside of recreational contexts (e.g., schools). Many of these alternatives are critical contributors to youth physical activity in non-urban settings (Yousefian et al., 2009).

Though other studies have effectively employed adult proxy approaches to gather information about youth recreation behavior and physical activity (Corder et al., 2011;

Larson, Green, & Cordell, 2011), the use of physical activity data reported by adult proxies introduces potential sources of error and estimation bias (Sallis & Saelens, 2000). Adults' perceptions of children's behavior and physical activity estimates may not represent true conditions, and adult proxies may incorrectly recall or intentionally exaggerate values and scores to comply with socially desirable norms. This limitation could be addressed by studies that effectively integrate subjective and objective physical activity surveillance measures (e.g., behavior observations, movement-tracking instruments) that supplement and validate self-reported data (Evenson & Mota, 2011; Rung, Mowen, Broyles, & Gustat, 2011).

A focus on flea markets to obtain data from individuals outside of state parks had several inherent advantages (convenient access to diverse, low-income, typically undersampled populations) and disadvantages (nonrepresentative portion of general population) that yielded novel information but constrained inferential power. Future studies could attempt to provide more definitive links between conventional and unconventional samples (e.g., state park visitors and flea market attendees could both be asked explicitly about their visitation/attendance at the other venues). Researchers could also expand this flea market sample frame to focus on entire non-urban communities on a larger scale, thereby facilitating inferences to the general population of diverse youth outside of cities. Despite these limitations, this study demonstrated that non-urban state parks provide important physical activity opportunities for youth in northern Georgia. By investigating youth state park-based physical activity, identifying social and environmental factors associated with this physical activity, and exploring youth's use of state parks relative to other physical activity destinations, results of this study highlight the potential role that state parks can play in physical activity promotion across diverse communities of children and adolescents in non-urban environments.

References

- Active Living Research. (2011). *The potential of safe, secure and accessible playgrounds to increase children's physical activity*. San Diego, CA: Active Living Research.
- Almanza, E., Jerrett, M., Dunton, G., Seto, E., & Pentz, M. A. (2012). A study of community design, greenness, and physical activity in children using satellite, GPS and accelerometer data. *Health & Place, 18*, 46–54. doi: 10.1016/j.healthplace.2011.09.003
- America's Great Outdoors. (2011). America's Great Outdoors: A promise to future generations. Retrieved from <http://americasgreatoutdoors.gov/report/>
- Babey, S. H., Hastert, T. A., Yu, H. J., & Brown, E. R. (2008). Physical activity among adolescents: "When do parks matter?" *American Journal of Preventive Medicine, 34*(4), 345–348.
- Baran, P. K., Smith, W. R., Moore, R. C., Floyd, M. F., Bocarro, J. N., Cosco, N. G., & Danninger, T. M. (2013). Park use among youth and adults: Examination of individual, social, and urban form factors. *Environment and Behavior*. doi: 10.1177/0013916512470134
- Bauman, A., & Craig, C. L. (2005). The place of physical activity in the WHO Global Strategy on Diet and Physical Activity. *International Journal of Behavioral Nutrition and Physical Activity, 2*(10), 1–6.
- Beets, M. W., Cardinal, B. J., & Alderman, B. L. (2010). Parental social support and the physical activity-related behaviors of youth: a review. *Health Education and Behavior, 37*(5), 621–644. doi: 10.1177/1090198110363884
- Blanck, H. M., Allen, D., Bashir, Z., Gordon, N., Goodman, A., Merriam, D., & Rutt, C. (2012). Let's go to the park today: The role of parks in obesity prevention and improving the public's health. *Childhood Obesity, 8*(5), 423–428.
- Boehmer, T. K., Luke, D. A., Haire-Joshu, D. L., Bates, H. S., & Brownson, R. C. (2008). Preventing childhood obesity through state policy: Predictors of bill enactment. *American Journal of Preventive Medicine, 34*(4), 333–340.
- Carver, A., Timperio, A., & Crawford, D. (2008). Playing it safe: the influence of neighbourhood safety on children's physical activity: A review. *Health & Place, 14*(2), 217–227. doi: 10.1016/j.healthplace.2007.06.004

- Centers for Disease Control and Prevention. (2009). *Behavioral Risk Factor Surveillance System Questionnaire*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Centers for Disease Control and Prevention. (2010). U.S. Physical Activity Statistics. Retrieved from <http://www.cdc.gov/nccdphp/dnpa/physical/stats/>
- Cleland, V., Timperio, A., Salmon, J., Hume, C., Telford, A., & Crawford, D. (2011). A longitudinal study of the family physical activity environment and physical activity among youth. *American Journal of Health Promotion, 25*(3), 159–167. doi: 10.4278/ajhp.090303-QUAN-93
- Cohen, D. A., Ashwood, J. S., Scott, M. M., Overton, A., Evenson, K. R., Staten, L. K., . . . Catellier, D. (2006). Public parks and physical activity among adolescent girls. *Pediatrics, 118*(5), e1381–e1389. doi: 10.1542/peds.2006-1226
- Cohen, D. A., Han, B., Derose, K. P., Williamson, S., Marsh, T., & McKenzie, T. L. (2013). Physical activity in parks: a randomized controlled trial using community engagement. *American Journal of Preventive Medicine, 45*(5), 590–597. doi: 10.1016/j.amepre.2013.06.015
- Corder, K., Sallis, J. F., Crespo, N. C., & Elder, J. P. (2011). Active children use more locations for physical activity. *Health & Place, 17*, 911–919. doi: 10.1016/j.healthplace.2011.04.008
- Cronan, M. K., Shinew, K. J., & Stodolska, M. (2008). Trail use among Latinos: Recognizing diverse uses among a specific population. *Journal of Park and Recreation Administration, 26*(1), 62–86.
- Cutts, B. B., Darby, K. J., Boone, C. G., & Brewis, A. (2009). City structure, obesity, and environmental justice: An integrated analysis of physical and social barriers to walkable streets and park access. *Social Science and Medicine, 69*(9), 1314–1322. doi: 10.1016/j.socscimed.2009.08.020
- Davison, K. K., & Lawson, C. (2006). Do attributes of the physical environment influence children's level of physical activity? *International Journal of Behavioral Nutrition and Physical Activity, 3*(19), 1–17. doi: 10.1186/1479-5868-3-19
- Epstein, L. H., Raja, S., Gold, S. S., Paluch, R. A., Pak, Y., & Roemmich, J. N. (2006). Reducing sedentary behavior: The relationship between park area and the physical activity of youth. *Psychological Science, 17*(8), 654–659.
- Evenson, K. R., & Mota, J. (2011). Progress and future directions on physical activity research among youth. *Journal of Physical Activity and Health, 8*, 149–151.
- Floyd, M. F., Bocarro, J. N., Smith, W. R., Baran, P. K., Moore, R. C., Cosco, N. G., . . . Fang, K. (2011). Park-based physical activity among children and adolescents. *American Journal of Preventive Medicine, 41*(3), 258–265. doi: 10.1016/j.amepre.2011.04.013
- Floyd, M. F., Spengler, J. O., Maddock, J. E., Gobster, P. H., & Suau, L. J. (2008a). Environmental and social correlates of physical activity in neighborhood parks: An observational study in Tampa and Chicago. *Leisure Sciences, 30*, 360–375. doi: 10.1080/01490400802165156
- Floyd, M. F., Spengler, J. O., Maddock, J. E., Gobster, P. H., & Suau, L. J. (2008b). Park-based physical activity in diverse communities of two U.S. cities: An observational study. *American Journal of Preventive Medicine, 34*(4), 299–305.
- Floyd, M. F., Taylor, W. C., & Whitt-Glover, M. (2009). Measurement of park and recreation environments that support physical activity in low-income communities of color: Highlights of challenges and recommendations. *American Journal of Preventive Medicine, 36*(4S), S156–S160. doi: 10.1016/j.amepre.2009.01.009
- Frank, L., Kerr, J., Chapman, J., & Sallis, J. (2007). Urban form relationships with walk trip frequency and distance among youth. *American Journal of Health Promotion, 21*(4), S1–S7.
- Frost, S. S., Goins, R. T., Hunter, R. H., Hooker, S. P., Bryant, L. L., Kruger, J., & Pluto, D. (2010). Effects of the built environment on physical activity of adults living in rural settings. *American Journal of Health Promotion, 24*(4), 267–283. doi: 10.4278/ajhp.08040532

- Gardsjord, H. S., Tveit, M. S., & Nordh, H. (2013). Promoting youth's physical activity through park design: Linking theory and practice in a public health perspective. *Landscape Research*. doi: 10.1080/01426397.2013.793764
- Gobster, P. H. (2002). Managing urban parks for a racially and ethnically diverse clientele. *Leisure Sciences*, 24, 143–159.
- Godbey, G., & Mowen, A. (2010). *The benefits of physical activity provided by park and recreation services: The scientific evidence*. Ashburn, VA: National Recreation and Park Association.
- Hohepa, M., Scragg, R., Schofield, G., Kolt, G. S., & Schaaf, D. (2007). Social support for youth physical activity: Importance of siblings, parents, friends and school support across a segmented school day. *International Journal of Behavioral Nutrition and Physical Activity*, 4, 54–63. doi: 10.1186/1479-5868-4-54
- Huston, S. L., Evenson, K. R., Bors, P., & Gizlice, Z. (2003). Neighborhood environment, access to places for activity, and leisure-time physical activity in a diverse North Carolina population. *American Journal of Health Promotion*, 18(1), 58–69.
- Joens-Matre, R. R., Welk, G. J., Calabro, M. A., Russell, D. W., Nicklay, E., & Hensley, L. D. (2008). Rural-urban differences in physical activity, physical fitness, and overweight prevalence of children. *The Journal of Rural Health*, 24(1), 49–54. doi: 10.1111/j.1748-0361.2008.00136.x
- Kellert, S. R. (2005). Nature and childhood development. In S. R. Kellert (Ed.), *Building for life: Designing and understanding the human-nature connection* (pp. 63–89). Washington, DC: Island Press.
- Kumanyika, S., & Grier, S. (2006). Targeting interventions for ethnic minority and low-income populations. *The Future of Children*, 16(1), 187–207.
- Larson, L. R., Green, G. T., & Cordell, H. K. (2011). Children's time outdoors: Results and implications of the National Kids Survey. *Journal of Park and Recreation Administration*, 29(2), 1–20.
- Larson, L. R., Whiting, J. W., Green, G. T., & Bowker, J. M. (2014). Physical activity locations in Georgia: Frequency of use by socio-demographic group. *Journal of Outdoor Recreation and Tourism*, 5–6, 68–72. doi: 10.1016/j.jort.2013.11.001
- Liu, J., Bennett, K. J., Harun, N., & Probst, J. C. (2008). Urban-rural differences in overweight status and physical inactivity among U.S. children aged 10–17 years. *The Journal of Rural Health*, 24(4), 407–415. doi: 10.1111/j.1748-0361.2008.00188.x
- Lou, D. W. (2014). *Sedentary behaviors and youth: Current trends and the impact on health*. San Diego, CA: Active Living Research.
- Maller, C., Townsend, M., Pryor, A., Brown, P., & St. Leger, L. (2006). Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International*, 21(1), 45–54.
- Marquez, D. X., & McAuley, E. (2006). Social cognitive correlates of leisure time physical activity among Latinos. *Journal of Behavioral Medicine*, 29(3), 281–289.
- Michimi, A., & Wimberly, M. C. (2012). Natural environments, obesity, and physical activity in nonmetropolitan areas of the United States. *The Journal of Rural Health*, 28, 398–407.
- Miles, R. (2008). Neighborhood disorder, perceived safety, and readiness to encourage use of local playgrounds. *American Journal of Preventive Medicine*, 34, 275–281.
- Miller, K. W., Wilder, L. B., Stillman, F. A., & Beckler, D. M. (1997). The feasibility of a street-intercept survey method in an African-American community. *Journal of Public Health*, 87(4), 655–658.
- Moody, J. S., Prochaska, J. J., Sallis, J. F., McKenzie, T. L., Brown, M., & Conway, T. L. (2004). Viability of parks and recreation centers as sites for youth physical activity promotion. *Health Promotion Practice*, 5(4), 438–443.
- Moore, J. B., Jilcott, S. B., Shores, K. A., Evenson, K. R., Brownson, R. C., & Novick, L. F. (2010). A qualitative examination of perceived barriers and facilitators of physical activity for urban and rural youth. *Health Education Research*, 25(2), 355–367. doi: 10.1093/her/cyq004

- Moskell, C., & Allred, S. B. (2013). Residents' beliefs about responsibility for the stewardship of park trees and street trees in New York City. *Landscape and Urban Planning, 120*, 85–95. doi: 10.1016/j.landurbplan.2013.08.002
- Mowen, A., Kaczynski, A., & Cohen, D. (2008). The potential of parks and recreation in addressing physical activity and fitness. *President's Council on Physical Fitness and Sports: Research Digest, 9*(1), 1–8.
- Mowen, A. J., Trautwein, N. E., Graefe, A. R., & Son, J. S. (2012). The influence of visitor characteristics on state park physical activity levels. *Journal of Park and Recreation Administration, 30*(2), 19–40.
- Nelson, M. C., Gordon-Larsen, P., Song, Y., & Popkin, B. M. (2006). Built and social environments: Associations with adolescent overweight and activity. *American Journal of Preventive Medicine, 31*(2), 109–117.
- Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in Body Mass Index among U.S. children and adolescents, 1999-2010. *Journal of the American Medical Association, 307*(5), 483–490. doi: 10.1001/jama.2012.40
- Pannell, J. (2011). Active kids are healthy kids: Back to school with Congressional youth initiatives. *Parks and Recreation, 46*(9), 29–30.
- Pate, R. R., Trost, S. G., Felton, G. M., Ward, D. S., Dowda, M., & Saunders, R. (1997). Correlates of physical activity behavior in rural youth. *Research Quarterly for Exercise and Sport, 68*(3), 241–248. doi: 10.1080/02701367.1997.10608003
- Richmond, T. K., Hayward, R. A., Gahagan, S., Field, A. E., & Heisler, M. (2006). Can school income and racial/ethnic composition explain the racial/ethnic disparity in adolescent physical activity participation? *Pediatrics, 117*(6), 2158–2166.
- Ries, A. V., Vorhees, C. C., Roche, K. M., Gittelsohn, J., Yan, A. F., & Astone, N. M. (2009). A quantitative examination of park characteristics related to park use and physical activity among urban youth. *Journal of Adolescent Health, 45*, S64–S70. doi: 10.1016/j.jadohealth.2009.04.020
- Roemmich, J. N., Epstein, L. H., Raja, S., Yin, L., Robinson, J., & Winiewicz, D. (2006). Association of access to parks and recreational facilities with the physical activity of young children. *Preventive Medicine, 43*(6), 437–441.
- Roux, L., Pratt, M., Tengs, T. O., Yore, M. M., Yanagawa, T. L., Ven Den Bos, J., Rutt, C., Brownson, R. C., Powell, K. E., Heath, G., Kohl, H. W., Teutsch, S., Cawley, J., Lee, I. M., West, L., & Buchner, D. M. (2008). Cost effectiveness of community-based physical activity interventions. *American Journal of Preventive Medicine, 35*(6), 578–588. doi: 10.1016/j.amepre.2008.06.040
- Rung, A. L., Mowen, A. J., Broyles, S. T., & Gustat, J. (2011). The role of park conditions and features on park visitation and physical activity. *Journal of Physical Activity and Health, 8*(Supplement 2), S178–S187.
- Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health, 27*, 297–322.
- Sallis, J. F., & Glanz, K. (2006). The role of built environments in physical activity, eating, and obesity in childhood. *The Future of Children, 16*(1), 89–108.
- Sallis, J. F., Owen, N., & Fisher, E. D. (2008). Ecological models of health behavior. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (pp. 466–485). San Francisco, CA: Jossey-Bass.
- Sallis, J. F., & Saelens, B. E. (2000). Assessment of physical activity by self-report: Status, limitations, and future directions. *Research Quarterly for Exercise and Sport, 71*(2), 1–14.
- Salmon, J., Veitch, J., Abbott, G., ChinAPaw, M., Brug, J. J., teVelde, S. J., Cleland, V., Hume, C., Crawford, D., & Ball, K. (2013). Are associations between the perceived home and neighbourhood environment and children's physical activity and sedentary behavior moderated by urban/rural location. *Health & Place, 24*, 44–53. doi: 10.1016/j.healthplace.2013.07.010

- Sanderson, B. K., Foushee, H. R., Bittner, V., Cornell, C. E., Stalker, V., Shelton, S., & Pulley, L. (2003). Personal, social, and physical environmental correlates of physical activity in rural African-American women in Alabama. *American Journal of Preventive Medicine*, 25(3), 30–37. doi: 10.1016/S0749-3797(03)00162-4
- Sherer, P. M. (2006). *The benefits of parks: Why America needs more city parks and open space*. San Francisco, CA: The Trust for Public Land.
- Shores, K. A., Moore, J. B., & Yin, Z. (2010). An examination of triple jeopardy in rural youth physical activity participation. *The Journal of Rural Health*, 26(4), 352–360. doi: 10.1111/j.1748-0361.2010.00301.x
- Shores, K. A., & West, S. T. (2010). Rural and urban park visits and park-based physical activity. *Preventive Medicine*, 50, S13–S17. doi: 10.1016/j.ypmed.2009.07.023
- Siikamaki, J. (2011). Contributions of the US state park system to nature recreation. *Proceedings of the National Academy of Sciences*, 108(34), 14031–14036. doi: 10.1073/pnas.1108688108
- Spengler, J. O., Floyd, M. F., Maddock, J. E., Gobster, P. H., Suau, L. J., & Norman, G. J. (2011). Correlates of park-based physical activity among children in diverse communities: Results from an observational study in two cities. *American Journal of Health Promotion*, 25(5), e1–e9. doi: 10.4278/ajhp.090211-QUAN-58
- Stodolska, M., Shiness, K. J., & Li, M. Z. (2010). Recreation participation patterns and physical activity among Latino visitors to three urban outdoor recreation environments. *Journal of Park and Recreation Administration*, 28(2), 36–56.
- Timperio, A., Giles-Corti, B., Crawford, D., Andrianopoulos, N., Ball, K., Salmon, J., & Hume, C. (2008). Features of public open spaces and physical activity among children: Findings from the CLAN study. *Preventive Medicine*, 47(5), 514–518.
- Trost, S. G., & Loprinzi, P. D. (2011). Parental influences on physical activity behavior in children and adolescents: a brief review. *American Journal of Lifestyle Medicine*, 5, 171–181. doi: 10.1177/1559827610387236
- Trost, S. G., Pate, R. R., Saunders, R., Ward, D. S., Dowda, M., & Felton, G. (1997). A prospective study of the determinants of physical activity in rural fifth-grade children. *Preventive Medicine*, 26(2), 257–263. doi: 10.1006/pmed.1996.0137
- Walker, J. T., Mowen, A. J., Hendricks, W. W., Kruger, J., Morrow Jr., J. R., & Bricker, K. (2009). Physical activity in the park setting (PA-PS) questionnaire: reliability in a California statewide sample. *Journal of Physical Activity and Health*, 6(Supplement 1), S97–S104.
- Wells, N. M., Ashdown, S. P., Davies, E. H. S., Cowett, F. D., & Yang, Y. (2007). Environment, design, and obesity: Opportunities for interdisciplinary collaborative research. *Environment and Behavior*, 39, 6–33. doi: 10.1177/0013916506295570
- Whiting, J. W., Larson, L. R., & Green, G. T. (2012). Monitoring visitation in Georgia state parks using the System for Observing Play and Recreation in Communities (SOPARC). *Journal of Park and Recreation Administration*, 30(3), 21–37.
- Whitt-Glover, M. C., Taylor, W. C., Floyd, M. F., Yore, M. M., Yancey, A. K., & Matthews, C. E. (2009). Disparities in physical activity and sedentary behaviors among U.S. children and adolescents: Prevalence, correlates, and intervention implications. *Journal of Public Health Policy*, 30, S309–S334. doi: 10.1057/jphp.2008.46
- Wilhelm-Stanis, S. A., Schneider, I. E., Shiness, K. J., Chavez, D. J., & Vogel, M. C. (2009). Physical activity and the Recreation Opportunity Spectrum: Differences in important site attributes and perceived outcomes. *Journal of Park and Recreation Administration*, 27(4), 73–91.
- Wilhelm Stanis, S. A., Schneider, I. E., & Anderson, D. A. (2009). State park visitors' leisure time physical activity, constraints, and negotiation strategies. *Journal of Park and Recreation Administration*, 27(3), 21–41.
- Yousefian, A., Ziller, E., Swartz, J., & Hartley, D. (2009). Active living for rural youth: Addressing physical inactivity in rural communities. *Journal of Public Health Management Practice*, 15(3), 223–231.